

# Predefined Diets in Inflammatory Bowel Disease Patients: A Systematic Review and Meta-Analysis

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## Abstract

IBD is a chronic disease mediated by the immune system that is distinguished by the importance of diet in pathological development. The purpose of this study is to learn how the use of predefined diets affects the adult population with IBD. A systematic review and meta-analysis were carried out. We discovered 4195 records using various databases (MEDLINE, Scopus, Cochrane, LILACS, CINAHL, and WOS). Following a review process, only 31 research studies were chosen for qualitative synthesis and 10 for meta-analysis. The variables used were: Crohn's Disease Activity Index (CDAI) for Crohn's Disease (CD) patients and faecal calprotectin (FC), C-Reactive Protein (CRP), and Albumin (ALB) for IBD patients. Prescribed diets are partially effective in the treatment of IBD and are compatible with other medical treatments. CDAI improved, but with reservations due to the high heterogeneity of the data, whereas ALB, FC, and CRP showed no differences. Because diets and the tools used to measure their effects vary so greatly, more studies evaluating the impact of predefined diets on IBD patients are required.

**Keywords:** Inflammatory bowel diseases • Nutrition therapy • Systematic review • Meta-analysis • Crohn's disease

## Introduction

IBD, which includes Crohn's Disease (CD) and Ulcerative Colitis (UC), is characterised by chronic inflammation of the gastrointestinal tract with periods of remission or recurrence. In CD, inflammation can occur anywhere along the gastrointestinal tract, whereas in UC, the inflammatory process only affects the colon. This type of disease has a wide range of symptoms, including diarrhoea, bloody stools, abdominal pain, fatigue, weight loss, and so on. In North America, Oceania, and many European countries, the prevalence exceeds 0.3%, and the incidence of these pathologies has increased rapidly in recently industrialised countries, resulting in a high burden on health systems. Apart from being treated with costly medical treatments to reduce its activity, IBD reduces the patient's quality of life, which can affect the degree of disability and work productivity and is associated with more symptoms of anxiety and depression. Furthermore, depending on the stage and/or progression of the disease, malnutrition and specific nutritional deficiencies are common among these patients, and most of them impose dietary restrictions based on their own beliefs. The cause of IBD is unknown; it is a multifactorial disease. However, Westernized lifestyles and diets are a major contributor to the rising incidence [1].

The microbial composition and function of the gut, the intestinal barrier, host immunity, and intestinal physiology are all influenced by diet.

In terms of nutritional treatment, there is evidence of efficacy for artificial nutrition, such as enteral and parenteral nutrition, but for natural nutrition, it appears that a diet low in fibre, high in fat, and high in carbohydrates can lead to severe dysbiosis, whereas one rich in fruits, vegetables, and olive oil can prevent it. However, in the absence of studies, their role in the development of the disease, along with the role of certain foods such as meat, fish, and dairy products, is controversial and uncertain [2].

On the other hand, while it appears that the implementation of predefined diets, such as the Specific Carbohydrate Diet (SCD) or the Crohn's disease exclusion diet, is beneficial for paediatric patients, studies conducted to date in the adult population have been inconclusive and the findings are inconsistent, in addition to being mostly concerned with the symptomatology of the inactive disease. As a result, there is a need for more and clearer evidence that allows health professionals to increase their knowledge to advise their patients on what type of specific dietary formulas or nutrients they will require, allowing them not only to comply with nutritional requirements but also to improve the outcome of their symptoms, resulting in a better quality of life. The goal of this study is to learn how predefined diets, as interventions, affect adults with IBD, to improve the dietary statements of current clinical guidelines [3].

## Discussion

Our systematic review included 31 studies that collected data from 5331 people with IBD who had an intervention with different predefined diets. All of the studies had a broad scope, and among the various effects discovered, CDAI, FC, CRP, and ALB were the most common, allowing us to conduct a meta-analysis to reach more comprehensive conclusions. The main premise of these diets was to reduce certain pro-inflammatory foods while increasing others that are thought to promote healthy intestinal microbiota [4]. In light of the high prevalence of malnutrition, diets that can modify the intestinal barrier and host immunity must be prioritised. While we did not see an improvement in ALB, CRP, or CF levels, we did see an improvement in CDAI levels in patients with CD who were given predefined diets, specifically a microparticles diet, a semi-vegetarian diet, and an immunoglobulin exclusion diet. Fermented oligosaccharides, disaccharides, monosaccharides, and polyols are reduced in the low FODMAP diet (LFD) because they are poorly absorbed in the small intestine and fermented by bacteria in the colon, causing intestinal discomfort and gas in sensitive individuals. This diet has primarily been used for patients with irritable bowel syndrome. However, due to the similarity of functional gut symptoms such as bloating, abdominal pain, wind, and diarrhoea, it has been transferred to patients with IBD. According to the findings of our systematic review, the majority of individuals improved their disease symptoms. This is consistent with other studies in which an LFD was used to treat gastrointestinal symptoms and found to be effective [5].

Furthermore, Pedersen et al., Testa et al., Bodini et al., and Cox et al. found that the LFD had a higher quality of life, despite using different questionnaires. Results of good adherence to this type of diet have also been reported, but the results in terms of disease activity have been controversial; while some authors found no improvements in biomarkers or indices such as CRP, FC, HBI, or IBS-SSS, others did. All of this, combined with the concern expressed by several authors that this type of diet may alter the microbiome by increasing colonic pH, allowing enteropathogenic colonisation and increasing dysbiosis, suggests that supplementation should be considered to avoid deficiencies caused by an LFD for long periods. Furthermore, it must be considered during the "induction" phase of diet modification prescription, and if patients do not respond to the modification, the FODMAP restriction should be discontinued, as it can compromise the patient's nutritional status and, some extent, can affect intestinal inflammation [6].

The Specific Carbohydrate Diet (SCD) is based on the hypothesis that IBD patients have disaccharidase dysfunction, which is required for the digestion and absorption of disaccharides and amylopectin. As a result, high levels of these compounds may cause an overgrowth of bacteria and intestinal lesions, which can increase intestinal permeability.

This is why this type of diet allows foods containing only monosaccharides and excludes disaccharides and the majority of polysaccharides. The most important results are an improvement in symptomatology and an increase in clinical remissions. SCD and LFD both have the potential to cause vitamin D deficiency [7]. Their clinical evaluation and follow-up are critical. The Immunglobulin Exclusion Diet (IGED) is a dietary strategy associated with the identification of foods that cause intolerance, defined as an IgG-mediated reaction that acts as a delayed-type hypersensitivity response to antigen exposure, all of which result in excessive protective immune responses that may lead to increased disease activity. The researchers, Rajendran, Gunasekera and Uzunismail obtained improvements in pathology activity using various tools.

However, results for symptomatology, quality of life, and certain biochemical parameters such as CRP and ALB were found to be contradictory. According to several authors, vegetarian dietary patterns are associated with lower serum CRP, fibrinogen, and total leukocyte concentrations. This is consistent with the findings of Chiba et al., who discovered an improvement in CRP, symptoms, and certain laboratory data. However, it has been linked to an increase in post-traumatic stress disorder and poor mental health.

We obtained positive results in the quality of life, HBI, FC, and cholesterol about the Mediterranean Diet (MED), which is characterised by the consumption of important sources of fibre (cereals, legumes, vegetables, fruits, and nuts) and a high content of chemical compounds with antioxidant properties such as flavonoids, phytosterols, vitamins, terpenes, and polyphenols. Currently, there is some debate about the role of this diet in IBD, with some authors claiming that a healthy diet pattern that includes the MED is associated with significant reductions in inflammation-related CRP, while others claim that this type of diet does not affect inflammatory substances. The Gluten-free Diet (GFD) also eliminates the gliadin protein found in wheat, barley, rye, and other grains. This diet has traditionally been used for celiac disease patients and, more recently, for people who are sensitive to non-celiac gluten. However, the nutrient responsible for the improvement is debatable because these cereals contain multiple symptom inducers such as gluten, fructans, trypsin amylase inhibitors, and lectins. Our systematic review's findings are contentious. On the one hand, this diet improved disease symptoms; on the other hand, it may increase anxiety and depression due to the difficulty of adherence [8].

These findings are consistent with the findings of some authors, who state that despite data indicating low adherence, GFD suggests a potential benefit and great utility in the management of IBD [9].

Despite being the first systematic review to address the general effects of predefined diets on adult IBD patients, this article is not without limitations. It is possible that the CONSORT questionnaire was not the best for evaluating the Non-randomized Controlled Clinical Trials (NRCCT) and Uncontrolled And Non-randomized Clinical Trials (UNRCT) reviewed. However, we attempted to avoid this limitation by adjusting the items of this tool to the type of study, as no questionnaire that evaluated the RCCT, NRCCT, and UNRCT was found. Furthermore, some studies were somewhat old, which could have lowered the tool's methodological quality score due to a lack of standard criteria at the time the clinical trials were conducted [10].

Due to the low number of studies that separated these diseases to elaborate on their results and the great variability, not only in the tools used but also in the unit of measurement employed, the UC and CD data were combined to perform a meta-analysis for the variables CDAI, FC, CRP, and ALB. However, the clinical courses of these clinical entities differ.

The findings of this study could help health professionals in clinical practice by developing a guide aimed at evaluating the addition of predefined diets to the set of medical therapies for an adult patient with IBD. This systematic review employed both clinical trials and observational studies, providing us with a more comprehensive picture of the effect of the intervention. Other types of predefined diets, which have been observed to show positive results in such patients but for which little evidence is found, should be considered as future lines of research.

## Conclusion

Prescribed diets are partially effective in the treatment of IBD and are compatible with other medical treatments. CDAI improved in patients with CD, but with reasonable doubt due to the high heterogeneity of the data, whereas no differences in ALB, FC, or CRP were observed. The most researched and beneficial dietary interventions for these patients are the LFD, IGED, MED, GFD, and vegetarian diets. The diets and tools used to measure their interventions, on the other hand, varied greatly. Furthermore, the mechanisms by which the food or nutrients are responsible for the improvement are unknown. More research into the impact of predefined diets on IBD patients is required.

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